Amendments to the Drawings:

The attached Replacement Sheets of drawings includes new drawing FIGS. 10-12. No changes or amendments were made to original drawing FIGS. 1-9 except for revising sheet numbers in accordance with the addition of FIGS. 10-12.

More specifically, new FIG. 10 is a graphical representation of an exemplary area 1000 enclosed by plotting the output of each uniquely colored LED from an LED array according to the present invention on a CIE Chromaticity diagram as a point and connecting the points. The area 1000 covers at least 75% of the total area 1002 defined within the curve of spectrally pure colors and an alychne of purple colors on the CIE Chromaticity diagram.

New FIG. 11 is a graphical representation of an exemplary area 1100 enclosed by plotting the output of each uniquely colored LED from an LED array according to the present invention on a CIE Chromaticity diagram as a point and connecting the points. The area 1100 covers at least 85% of the total area 1002 defined within the curve of spectrally pure colors and an alychne of purple colors on the CIE Chromaticity diagram.

New FIG. 12 is a graphical representation of an exemplary area 1200 enclosed by plotting the output of each uniquely colored LED from an LED array according to the present invention on a CIE Chromaticity diagram as a point and connecting the points. The area 1200 covers at least 95% of the total area 1002 defined within the curve of spectrally pure colors and an alychne of purple colors on the CIE Chromaticity diagram.

Support for these new drawing FIGS. 10-12 may be found in the original Claims 27-29 of the as-filed application. No new matter has been added.

REMARKS

The non-final Office Action mailed March 30, 2007, has been received and reviewed. As of the March 30, 2007 Office Action, Claims 1-47 were pending and Claims 36-47 were withdrawn from consideration as being drawn to a non-elected species based on the telephonic Election made March 7, 2007. Claims 1-35 presently stand rejected. The Examiner has objected to the drawings.

Applicant herein amends Claims 1, 27-29 and 31-35. Applicant herein cancels Claim 35 and withdrawn Claims 36-47 without prejudice and expressly reserves the right to prosecute those claims in a divisional or continuation patent application. Applicant herein adds new claims 48-53. As of this AMENDMENT A, Claims 1-34 and 48-53 are believed to be in condition for allowance and Applicant respectfully requests reconsideration of the application as amended herein.

Election without Traverse

The Examiner has required an affirmation on whether the telephonic Election of March 7, 2007 was made with or without traverse. The Election is without traverse.

Applicant further clarifies herein that Applicant's Election of Group I, *i.e.*, Claims 1-35, is drawn to multicolor LED arrays, not "single" colored LED arrays.

Drawings Objection

The Examiner has objected to the drawings under 37 C.F.R. § 1.83(a). Specifically, the Examiner asserts that the drawings must show every feature of the invention specified in the claims. More specifically, the Examiner has requested drawings that illustrate the subject matter of Claims 27-29 and 35.

Per the Examiner's suggestion, Applicant submits herewith new drawing FIGS. 10-12 which are exemplary plots of areas enclosed by plotting an output of each uniquely colored LED from an LED array on a CIE Chromaticity diagram as a point and connecting the points, wherein the areas cover at least 75%, 85% and 95%, respectively, of a total area defined within a curve of spectrally pure colors and an alychne of purple colors, as recited in Claims 27-29. Claim 35 has been cancelled herein obviating the

drawing objection directed to same. No new matter has been added.

Applicant respectfully requests reconsideration of the objection to the drawings based on the replacement sheets of the drawings enclosed herein.

35 U.S.C. § 112, ¶ 2 Indefiniteness Rejection

The Examiner has rejected Claims 1, 27-29 and 35 under 35 U.S.C. § 112, ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to Claim 1, the Examiner asserts that the term "from a distance of at least 24 inches" is a relative term which renders the claim indefinite. Applicant has amended Claim 1 to eliminate the disputed limitation altogether, thus obviating the rejection. The excised limitation is unnecessary for patentability and overly limiting of the invention.

With regard to Claims 27-29, the Examiner asserts that it is unclear how Applicant can plot an area by plotting an output of "identically" colored LEDs. Applicant has amended Claims 27-29 to cure errors in antecedent basis, not related to patentability. Applicant has further amended Claim 1, from which Claims 27-29 depend, to recited the additional limitation: "the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs." As amended, it should be clear that an area can be obtained by plotting the output of "at least five distinct narrowband colors". Finally, Applicant has added new drawing FIGS. 10-12 which are examples of areas obtained by plots according to Claims 27-29, respectively, which illustrate the claimed subject matter. These amendments and the new drawing FIGS. 10-12 submitted herein are believed to render the original Claims 27-29 definite.

As added clarification, Claim 1 as amended herein should be construed to cover five or more unique, distinct or different narrowband colors of LEDs in a single LED array. Such an LED array may, or may not, have white LEDs in addition to the "at least five distinct narrowband colors". For example and not by way of limitation, an LED array including: violet 410 nm, indigo 445 nm, blue 475 nm, cyan 500 nm, aqua 520 nm (or any other at least five spectrally narrowband colored LEDs) and one or more white LEDs

(spectrally wideband) falls within the scope of amended Claim 1. As another example, an LED array including: violet 410 nm, indigo 445 nm, blue 475 nm, cyan 500 nm, aqua 520 nm (or any other at least five spectrally narrow colored LEDs) and no white LEDs would also fall within the scope of amended Claim 1. It will be understood that the particular narrowband colors in the above examples are merely exemplary and are not meant to be limiting of the scope of Claim 1. Furthermore, LED arrays having 6, 7, 8 or more narrowband colors with or without white would also be within the scope of amended Claim 1.

Applicant has amended Claims 31-34 for consistent and proper notation for temperature as measured in Kelvins (K). Thus, the amendments to Claims 31-34 are for grammatical reasons and not for reasons of patentability.

For all of the above reasons, Applicant asserts that Claims 1 and 27-29 are definite and respectfully requests reconsideration of the rejection based on 35 U.S.C. § 112, ¶ 2.

35 U.S.C. § 103(a) Obviousness Rejections

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 5,803,579 to Turnbull et al.

The Examiner has rejected Claims 1-2 and 20-23 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. in view of Turnbull et al. As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each

uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Muthu et al. discloses an array 26 of Red 24, Green 22, and Blue 28 LEDs used to make "a white luminary LED". Col. 1:60 to Col. 2:31; FIG. 1. The invention of Muthu et al. "relates to LED Luminaries and more specifically, to a control system for providing white light with selectable color temperature and dimming level." Col. 1:5-8.

Turnbull et al. discloses an LED array having only two complementary colors, e.g., "blue-green and amber" that when mixed "form a metameric white illumination." Col. 7:66 to Col. 8:7. The invention of Turnbull et al. attempts to solve the problem of providing "a highly reliable, low-voltage, long-lived, LED illuminator capable of producing white light with sufficient luminous intensity to illuminate subjects of interest." Col. 7:19-24. Turnbull et al. specifically distinguishes its binary-complementary LED approach to white light generation over RGB systems such as Muthu et al. because of the added complexity. See, Col. 19:55 to Col. 20:20. "In addition, process controls, inventory management, materials handling, and electronic circuit design are further simplified by only having two colors to manipulate rather than three. This substantial simplification decreases manufacturing costs significantly." Col. 22:28-35.

Clearly, Turnbull teaches away from using 5 or more narrowband colored LEDs in addition to any white (broadband) LEDs recited in Claim 1 because of the increased complexity. Neither Muthu et al. nor Turnbull et al. suggest using more than at most three unique narrowband colors of LEDs for any application.

Claims 2 and 20-23 all depend from amended Claim 1. For all of these reasons, Applicant asserts that Claims 1-2 and 20-23 are nonobvious over the asserted combination of Muthu et al. in view of Turnbull et al.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 5,803,579 to Turnbull et al. as applied to Claim 1 and further in view of LEDTRONICS, Inc. (100-02a.htm)

The Examiner has rejected Claims 3-5 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. and Turnbull et al. in view of LEDTRONICS, Inc. (100-02a.htm). The Examiner acknowledges that neither Muthu et al. nor Turnbull et al. teaches LEDs producing colored light with a spectral half-width of less than about 60 nm, 40 nm, or 30 nm. The Examiner asserts that LEDTRONICS, Inc. (100-02a.htm) teaches LEDs having spectral half-widths ranging from 90 nm to 20 nm, which in combination with Muthu et al. and Turnbull et al. renders Claims 3-5 obvious.

As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Claims 3-5 depend from amended Claim 1. Applicant asserts that none of the references of record appear to teach or suggest an LED array comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 3-5.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 5,803,579 to Turnbull et al. as applied to Claim 1 and further in view of LEDTRONICS, Inc. (38.htm)

The Examiner has rejected Claims 6-7, 9-10, 12-13 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. and Turnbull et al. and further in view of LEDTRONICS, Inc. (38.htm). The Examiner acknowledges that neither Muthu et al. nor Turnbull et al. teaches the limitations recited in Claims 6-7, 9-10, 12-13 and 15-19. The Examiner asserts that LEDTRONICS, Inc. (38.htm) teaches or suggests the additional limitations, which in combination with Muthu et al. and Turnbull et al. renders Claims 6-7, 9-10, 12-13 and 15-19 obvious.

As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs

comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Claims 6-7, 9-10, 12-13 and 15-19 depend from amended Claim 1. Applicant asserts that none of the references of record appear to teach or suggest an LED array comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 6-7, 9-10, 12-13 and 15-19.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. and U.S. Patent No. 5,803,579 to Turnbull et al. and LEDTRONICS, Inc. (38.htm) as applied to Claim 1 and further in view of The LED Museum (ledleft.htm)

The Examiner has rejected Claims 8, 11 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. and Turnbull et al. and LEDTRONICS, Inc. (38.htm) and further in view of The LED Museum (ledleft.htm). The Examiner acknowledges that neither Muthu et al. nor Turnbull et al. and LEDTRONICS, Inc. (38.htm) teach the limitations recited in Claims 8, 11 and 14. The Examiner asserts that The LED Museum (ledleft.htm) teaches or suggests the additional limitations, which in combination with Muthu et al. and Turnbull et al. and LEDTRONICS, Inc. (38.htm) renders Claims 8, 11 and 14 obvious.

As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Claims 8, 11 and 14 depend from amended Claim 1. Applicant asserts that none of the references of record appear to teach or suggest an LED array comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 8, 11 and 14.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. and U.S. Patent No. 5,803,579 to Turnbull et al. as applied to Claim 1

The Examiner has rejected Claims 24-26 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. and Turnbull et al. The Examiner acknowledges that neither Muthu et al. nor Turnbull et al. teaches the amount of power that each of the plurality of LEDs comprise. The Examiner asserts that it would have been obvious to one skilled in the art at the time the invention was made to perform testing to acquire the optimal wattage values to avoid overheating, thus rendering Claims 24-26 obvious.

As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Claims 24-26 depend from amended Claim 1. Applicant asserts that none of the references of record appear to teach or suggest an LED array comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 24-26.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 5,803,579 to Turnbull et al. as applied to Claim 1 and further in view of LEDTRONICS, Inc. (097b.htm)

The Examiner has rejected Claims 30-34 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. and Turnbull et al. and further in view of LEDTRONICS, Inc. (097b.htm). The Examiner acknowledges that neither Muthu et al. nor Turnbull et al. teaches the relative luminance values for all LEDs within the LED array operating at full brightness levels, resulting in a composite white-type light that may be plotted on a CIE Chromaticity diagram within McAdam ellipses that are on or adjacent to a Planckian

Locus within a predefined correlated color temperature range, as recited in Claim 30. The Examiner asserts that LEDTRONICS, Inc. (097b.htm) teaches or suggests the CIE Chromaticity diagrams from 1931 and 1976 which show the relative luminance values of all LEDs operating at full brightness levels plotted on a CIE Chromaticity diagram and various temperature ranges as recited in Claims 30-34, which in combination with Muthu et al. and Turnbull et al. renders Claims 30-34 obvious.

As noted above, Applicant has amended Claim 1 to recite "[a]n LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible spectrum (400 to 750 nm), the plurality of LEDs comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs."

Claims 30-34 depend from amended Claim 1. Applicant asserts that none of the references of record appear to teach or suggest an LED array comprising at least five distinct narrowband colors in addition to or without white (broadband) LEDs. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 30-34.

New Claims 48-53.

New Claims 48-53 are directed to statistical correlations, *i.e.*, correlation coefficients, of the spectral power distribution of LED arrays of the present invention and the spectral power distribution of midday sun. Power spectral distributions of various combinations of LEDs in LED arrays and sunlight are shown in FIGS. 3-7. The correlation coefficient, also known as the "Pearson product-moment correlation coefficient" is a well known parameter to those of ordinary skill in the art at or before the priority date of the present application. No new matter has been added.

CONCLUSION

Claims 1-34 and 48-53 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 50-0881.

Respectfully Submitted,

Paul C. Oestreich
Registration Number 44,983
Attorney for Applicant
MORRISS O'BRYANT COMPAGNI, P.C.
734 East 200 South
Salt Lake City, Utah 84102-2202
(801) 478-0071 Telephone
(801) 478-0071 Facsimile
Oestreich@UtahPatents.com

PCO/st

Enclosure: Replacement Drawing Sheets 1-12 as noted herein